

***ENTROPY CONSTRAINTS ON VERTICAL HEAT
TRANSPORT AND STRUCTURES***

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ABSTRACT

Vertical heat transport by evaporation and condensation is a key process in transferring energy from the Earth's surface to the atmosphere. Although this process has been studied for a long time, thermodynamic constraints on this process and on the vertical structures of the atmosphere are still poorly understood and quantified. In this work, we use a simple 1D vertical energy-entropy climate model to investigate this issue. Especially, we explore the roles of the entropy-related constraints in determining vertical heat transport and atmospheric vertical structures. The sensitivities of the vertical distributions of atmospheric temperature, the energy and entropy fluxes to the variation of solar radiation are also discussed.